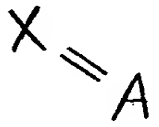
AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions and listings of claims in the above-identified U.S. patent application.

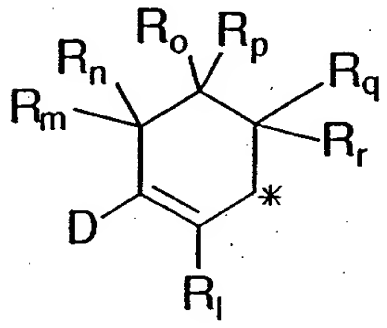
LISTING OF CLAIMS

Claim 1. (currently amended) A compound having a formula A:

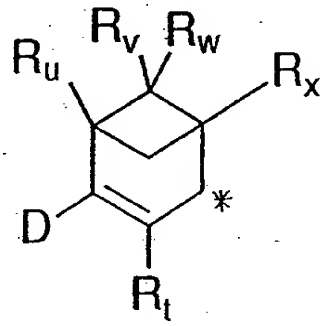


(formula A)

wherein X is selected from the group consisting of

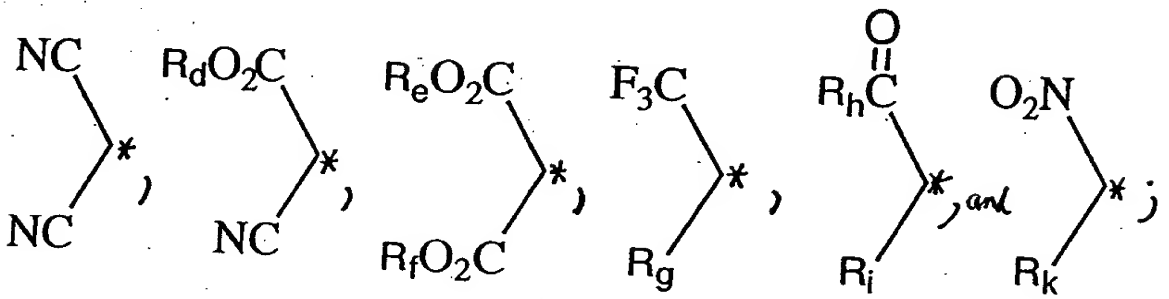


and



wherein D is selected from the group consisting of NR_aR_b, OR_a, SR_a, PR_aR_b, and R_c;

wherein A is selected from the group consisting of:



C1 cont.

wherein R_a, R_b, and R_c are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group;

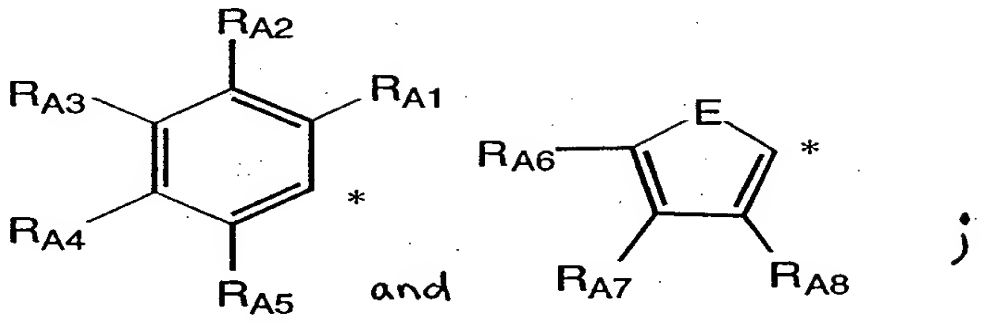
wherein R_d, R_e, R_f, R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_s, R_t, R_u, R_v, R_w, and R_x are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear hydrocarbon group; a branched hydrocarbon group; a cyclic hydrocarbon group ~~that is saturated or unsaturated~~ ; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group; wherein the hydrocarbon group is saturated or unsaturated;

wherein R_g, R_h, R_i, and R_k are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear hydrocarbon group; a branched hydrocarbon group; a cyclic hydrocarbon group ~~that is saturated or unsaturated~~ ; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; an aryl group; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; $-CO_2R_d$; and $-COR_d$; wherein the hydrocarbon group is saturated or unsaturated;

C1 Cont.

wherein each aryl group is optionally independently selected from the group consisting of



;

wherein R_{A1}, R_{A2}, R_{A3}, R_{A4}, R_{A5}, R_{A6}, R_{A7}, and R_{A8} are the same or different and are each independently selected from the group consisting of H, a linear alkyl group, a branched alkyl group, and a cyclic alkyl group;

C1 cont.

wherein E is selected from the group consisting of S, O, and NR_s;

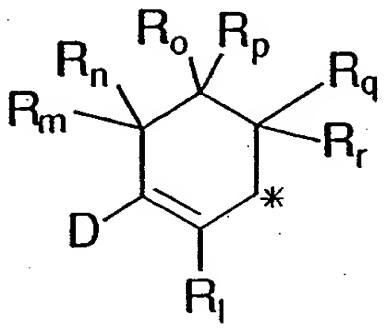
wherein the alkyl group is optionally substituted or unsubstituted and optionally includes up to 25 carbon atoms;

wherein α is an integer that is greater than or equal to 0 and less than or equal to 25;

wherein β is an integer that is greater than or equal to 0 and less than or equal to 25;

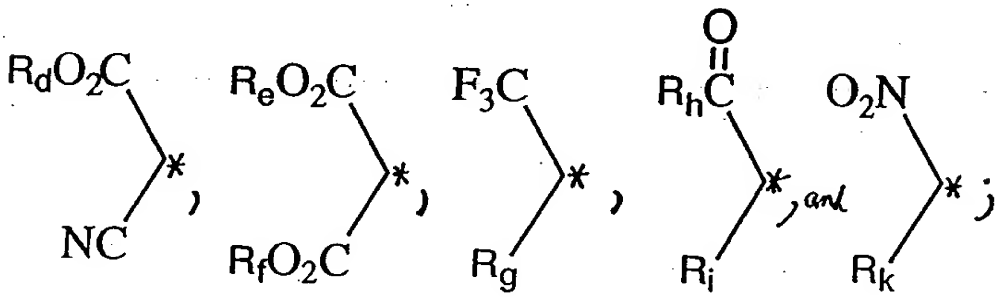
wherein γ is an integer that is greater than or equal to 0 and less than or equal to 25;

wherein when: D is CH_3; R_1, R_m, R_n, R_q, and R_r are each H; R_o is H, methyl, ethyl, propyl, or butyl; R_p is H, methyl, ethyl, propyl, or butyl; ~~and~~ X is



~~then:~~ and A is ~~not C(CN)(CN); and R_n is not methyl, ethyl, propyl, or butyl when R_1 is H and A is~~ selected from the group consisting of:

C, cont.



then:

if α is 0 and β is 0, R_d is selected from the group consisting of: H; a linear hydrocarbon group having at least five carbon atoms; a branched hydrocarbon group having at least five carbon atoms; a cyclic hydrocarbon group having at least five carbon atoms; a linear alkyl group having at least five carbon atoms; a branched alkyl group having at least five carbon atoms; a cyclic alkyl group having at least five carbon atoms; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; and $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; wherein the hydrocarbon group is saturated or unsaturated;

if α or β is greater than 0, R_d is selected from the group consisting of: H; a linear hydrocarbon group having at least five carbon atoms; a branched hydrocarbon group having at least five carbon atoms; a cyclic hydrocarbon group having at least five carbon atoms; a linear alkyl group having at least five carbon atoms; a branched alkyl group having at least five carbon atoms; a cyclic alkyl group having at least five carbon atoms; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; and $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; wherein the hydrocarbon group is saturated or unsaturated; and

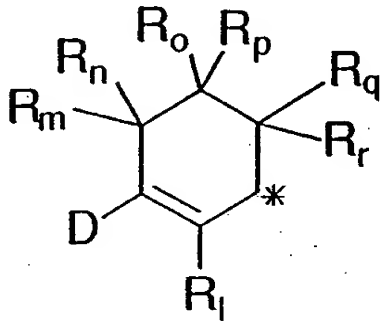
C1 Cont.

if R_i is H, R_h is selected from the group consisting of: H; a linear hydrocarbon group having at least five carbon atoms; a branched hydrocarbon group having at least five carbon atoms; a cyclic hydrocarbon group having at least five carbon atoms; a linear alkyl group having at least five carbon atoms; a branched alkyl group having at least five carbon atoms; a cyclic alkyl group having at least

five carbon atoms; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; an aryl group; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; $-CO_2R_d$; and $-COR_d$; wherein the hydrocarbon group is saturated or unsaturated;

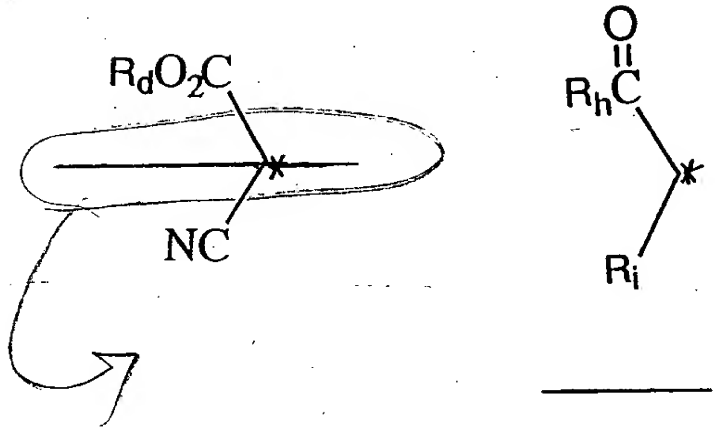
C1 cont.

wherein when: D is ~~CH_3~~ is H, NR_aR_b, or R_c; R_l, R_m, R_n, R_q, and R_r are each H; R_o is H, methyl, ethyl, propyl, or butyl; R_p is H, methyl, ethyl, propyl, or butyl; X is



and A is

C1 cont



then: ~~R_a is not methyl, ethyl, propyl, or butyl; and~~

R_a and R_b are the same or different and are each independently selected from the group consisting of: H; a linear

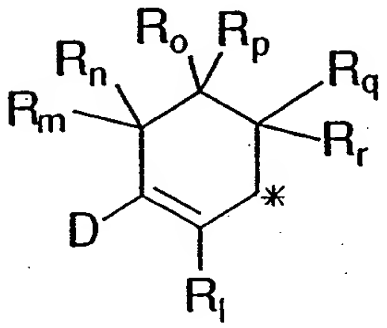
alkyl group having at least five carbon atoms; a branched alkyl group having at least five carbon atoms; a cyclic alkyl group having at least five carbon atoms; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group;

if D is $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$, α or β is greater than 0;

R_e and R_f are the same or different and are each independently selected from the group consisting of: H; a linear hydrocarbon group having at least five carbon atoms; a branched hydrocarbon group having at least five carbon atoms; a cyclic hydrocarbon group having at least five carbon atoms; a linear alkyl group having at least five carbon atoms; a branched alkyl group having at least five carbon atoms; a cyclic alkyl group having at least five carbon atoms; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group; wherein the hydrocarbon group is saturated or unsaturated; and

C1 cont.

wherein when: R_l is H, Cl, Br, or I; R_m, R_n, R_q, and R_r are each H; R_o is H, methyl, ethyl, propyl, butyl, or aryl; R_p is H, methyl, ethyl, propyl, butyl, or aryl; A is C(CN)(CN); and X is



then: D is ~~not methyl;~~

~~D is not OR_a when R_a is H, methyl, ethyl, propyl, butyl, or aryl;~~

~~ß is not equal to 1, 2, 3, or 4 when α is 0 and D is $(CH_2CH_2O)_\alpha$-$(CH_2)_\beta$ Phenyl; and~~

~~ß is not equal to 0 when α is 0, D is $(CH_2CH_2O)_\alpha$-$(CH_2)_\beta OR_{A1}$, and R_{A1} is methyl, ethyl, propyl, or butyl.~~ selected from the group consisting of:

NR_aR_b, SR_a, PR_aR_b, and R_c; and

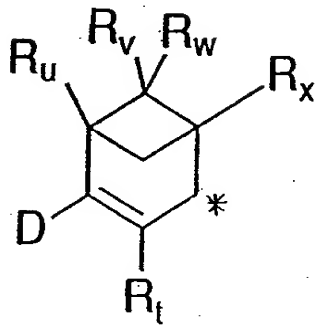
R_c is selected from the group consisting of:

a linear alkyl group having at least five carbon atoms; a branched alkyl group having at least five carbon atoms; a cyclic alkyl group having at least five carbon atoms; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$;

C1 Cont.

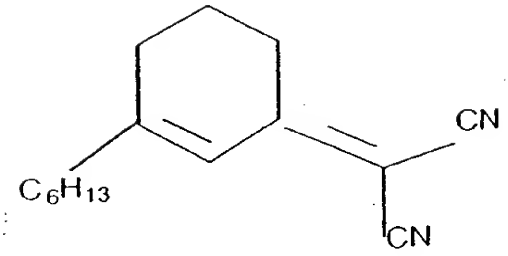
$-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$;
$-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$;
$-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$;
$-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$;
and an aryl group.

Claim 2. (previously presented) A compound as claimed in Claim 1, wherein X is



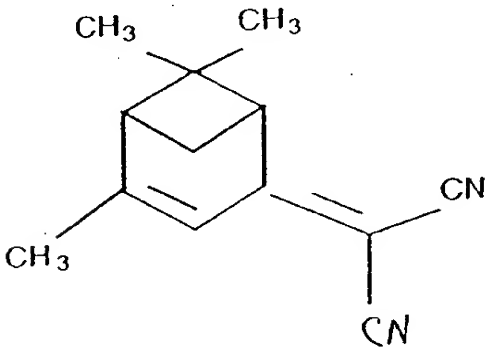
C1 cont.

Claim 3. (previously presented) A compound as claimed in Claim 1, wherein the compound is selected from the group consisting of



(II)

and



(IV)

C1 cont.

(delete formulas I and II, add a period at the end of claim)

Claim 4. (original) A liquid-crystal dopant comprising a compound as claimed in Claim 1.

Claim 5. (original) A liquid-crystal dopant comprising a compound as claimed in Claim 2.

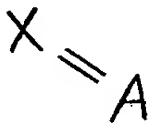
Claim 6. (original) A liquid-crystal dopant comprising a compound as claimed in Claim 3.

Claim 7. (previously presented) A liquid-crystal dopant comprising the compound claimed in Claim 1, wherein the liquid-crystal dopant has: (1) at about 20-30°C an absorption loss in a visible region of less than or equal to about 5%; (2) at about 20-30°C a dielectric anistropy of greater than about 5.0; and (3) at about 20-30°C a viscosity lower than about 50 centipoise.

Claim 8. (original) A composition comprising a liquid-crystal mixture and a liquid-crystal dopant as claimed in Claim 7, wherein the composition at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a refractive index of the composition at a visible wavelength and T is a temperature of the composition in °C.

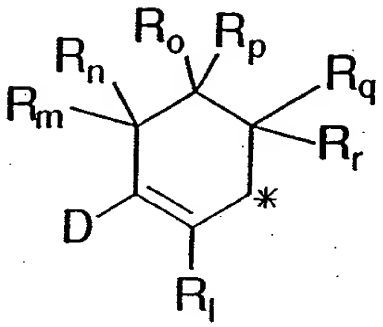
C1. Cont.

Claim 9. (currently amended) A composition comprising a liquid-crystal mixture and a compound having a formula A:

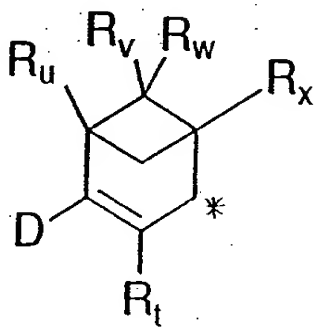


(formula A)

wherein X is selected from the group consisting of



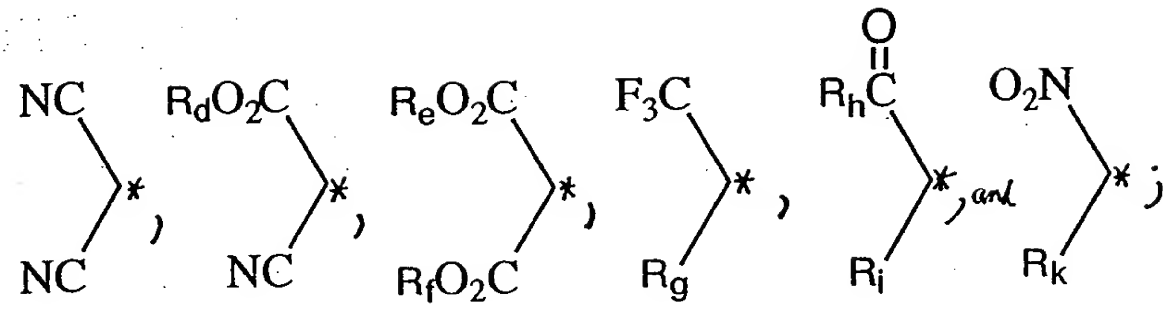
and



C. cont.

wherein D is selected from the group consisting of NR_aR_b, OR_a, SR_a, PR_aR_b, and R_c;

wherein A is selected from the group consisting of:



wherein R_a, R_b, and R_c are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group;

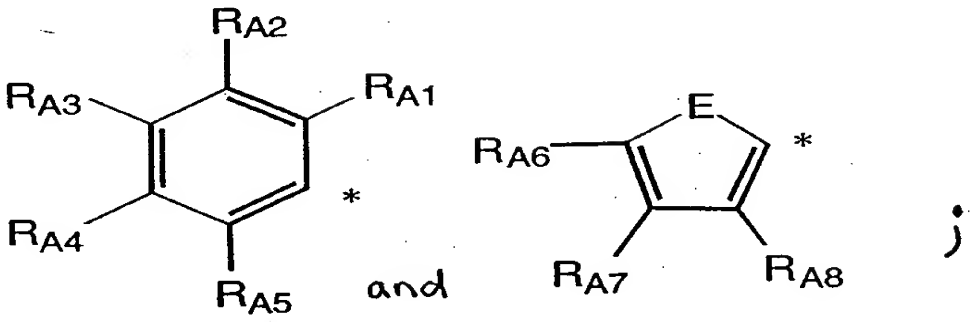
wherein R_d, R_e, R_f, R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_s, R_t, R_u, R_v, R_w, and R_x are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear hydrocarbon group; a branched hydrocarbon group; a cyclic hydrocarbon group ~~that is saturated or unsaturated~~ ; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group; wherein the hydrocarbon group is saturated or unsaturated;

C, cont.

wherein R_g, R_h, R_i, and R_k are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear hydrocarbon group; a branched hydrocarbon group; a cyclic hydrocarbon group ~~that is saturated or unsaturated~~ ; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; an aryl group; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; $-CO_2R_d$; and $-COR_d$; wherein the hydrocarbon group is saturated or

unsaturated;

wherein each aryl group is optionally independently selected from the group consisting of



;

wherein R_{A1}, R_{A2}, R_{A3}, R_{A4}, R_{A5}, R_{A6}, R_{A7}, and R_{A8} are the same or different and are each independently selected from the group consisting of H, a linear alkyl group, a branched alkyl group, and a cyclic alkyl group;

C, cont.

wherein E is selected from the group consisting of S, O, and NR_s;

wherein the alkyl group is optionally substituted or unsubstituted and optionally includes up to 25 carbon atoms;

wherein α is an integer that is greater than or equal to 0 and less than or equal to 25;

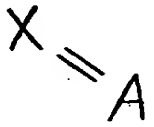
wherein β is an integer that is greater than or equal to 0 and less than or equal to 25; and

wherein γ is an integer that is greater than or equal to 0 and less than or equal to 25.

Claim 10. (original) A composition as claimed in Claim 9, where-

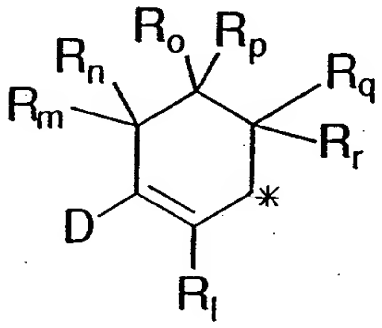
in the compound comprises less than or equal to about 50% by weight of the composition.

Claim 11. (currently amended) A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding to the liquid-crystal mixture a compound having a formula A:

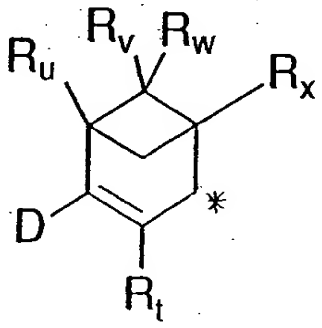


(formula A)

wherein X is selected from the group consisting of

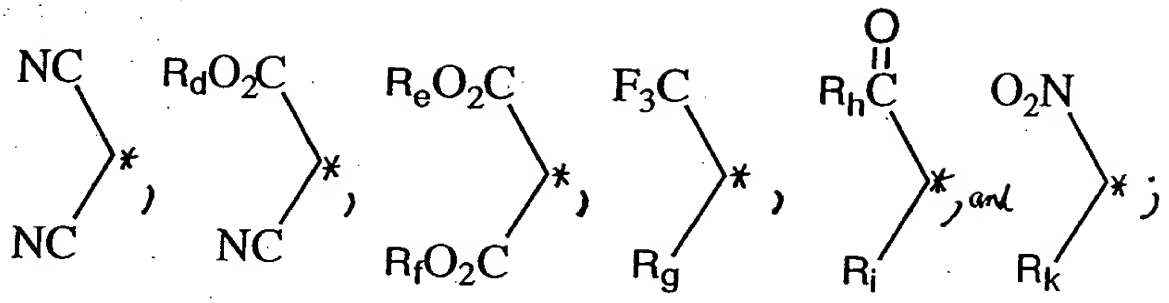


and



wherein D is selected from the group consisting of NR_aR_b, OR_a, SR_a, PR_aR_b, and R_c;

wherein A is selected from the group consisting of:



wherein R_a, R_b, and R_c are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group;

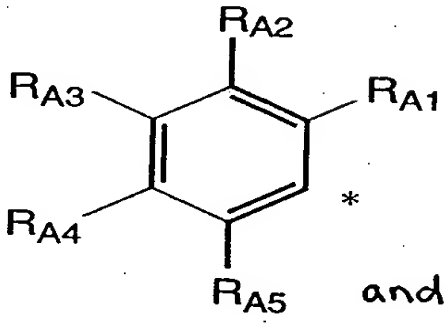
wherein R_d, R_e, R_f, R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_s, R_t, R_u, R_v, R_w, and R_x are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear hydrocarbon group; a branched hydrocarbon group; a cyclic hydrocarbon group ~~that is saturated or unsaturated~~ ; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group; wherein the hydrocarbon group is saturated or unsaturated;

C, cont.

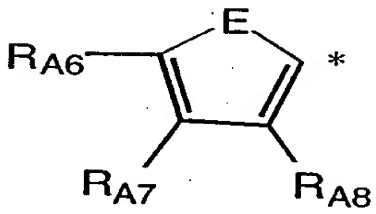
wherein R_g, R_h, R_i, and R_k are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear hydrocarbon group; a branched hydrocarbon group; a cyclic hydrocarbon group ~~that is saturated or unsaturated~~ ; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; an aryl group; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; $-CO_2R_d$; and $-COR_d$; wherein the hydrocarbon group is saturated or

unsaturated;

wherein each aryl group is optionally independently selected from the group consisting of



and



;

wherein R_{A1}, R_{A2}, R_{A3}, R_{A4}, R_{A5}, R_{A6}, R_{A7}, and R_{A8} are the same or different and are each independently selected from the group consisting of H, a linear alkyl group, a branched alkyl group, and a cyclic alkyl group;

C1 cont.

wherein E is selected from the group consisting of S, O, and NR_s;

wherein the alkyl group is optionally substituted or unsubstituted and optionally includes up to 25 carbon atoms;

wherein α is an integer that is greater than or equal to 0 and less than or equal to 25;

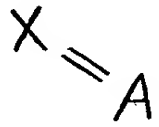
wherein β is an integer that is greater than or equal to 0 and less than or equal to 25; and

wherein γ is an integer that is greater than or equal to 0 and less than or equal to 25.

Claim 12. (original) A method as claimed in Claim 11, wherein an

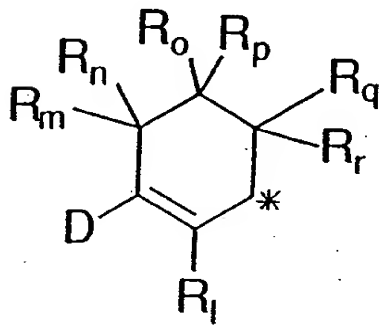
amount of the compound is added to and mixed with the liquid-crystal mixture to yield a resulting mixture, wherein the amount of the compound is less than or equal to about 50% by weight of the resulting mixture.

Claim 13. (currently amended) A method for tuning a clearing temperature of a liquid-crystal mixture, the method comprising adding to the liquid-crystal mixture 1 a compound having a formula A:

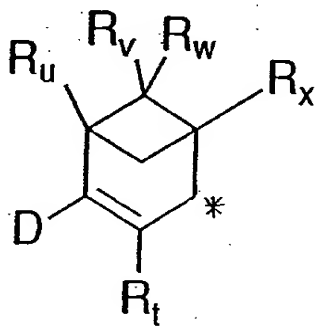


(formula A)

wherein X is selected from the group consisting of

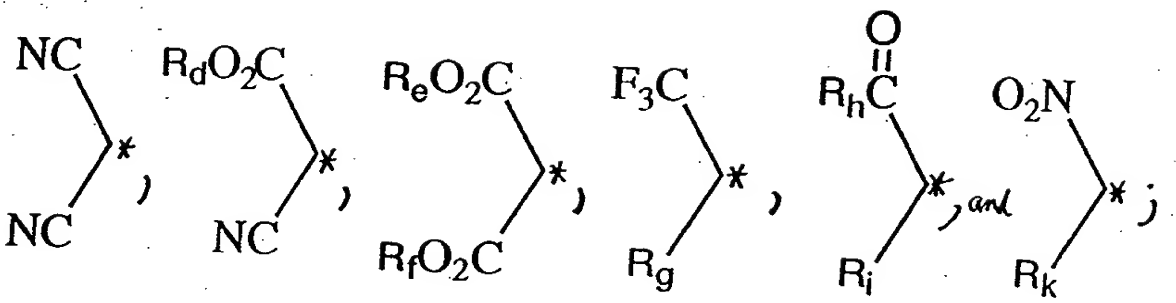


and



wherein D is selected from the group consisting of NR_aR_b, OR_a, SR_a, PR_aR_b, and R_c;

wherein A is selected from the group consisting of:



wherein R_a, R_b, and R_c are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group;

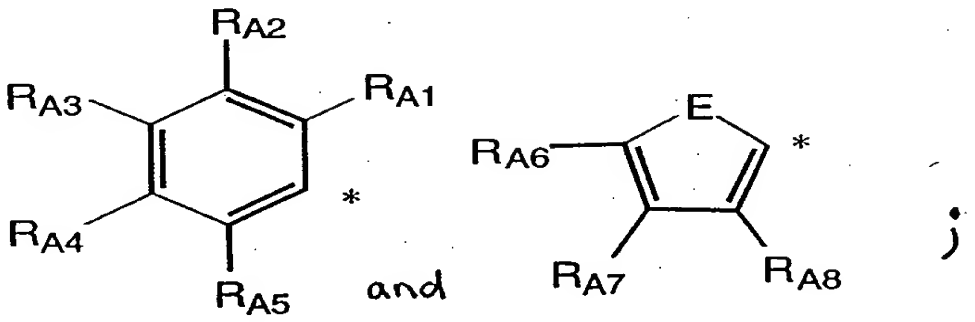
wherein R_d, R_e, R_f, R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_s, R_t, R_u, R_v, R_w, and R_x are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear hydrocarbon group; a branched hydrocarbon group; a cyclic hydrocarbon group ~~that is saturated or unsaturated~~ ; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group; wherein the hydrocarbon group is saturated or unsaturated;

C1 cont.

wherein R_g, R_h, R_i, and R_k are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear hydrocarbon group; a branched hydrocarbon group; a cyclic hydrocarbon group ~~that is saturated or unsaturated~~ ; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; an aryl group; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; $-CO_2R_d$; and $-COR_d$; wherein the hydrocarbon group is saturated or

unsaturated;

wherein each aryl group is optionally independently selected from the group consisting of



;

wherein R_{A1}, R_{A2}, R_{A3}, R_{A4}, R_{A5}, R_{A6}, R_{A7}, and R_{A8} are the same or different and are each independently selected from the group consisting of H, a linear alkyl group, a branched alkyl group, and a cyclic alkyl group;

Cont. wherein E is selected from the group consisting of S, O, and NR_s;

wherein the alkyl group is optionally substituted or unsubstituted and optionally includes up to 25 carbon atoms;

wherein α is an integer that is greater than or equal to 0 and less than or equal to 25;

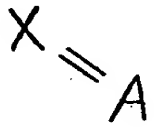
wherein β is an integer that is greater than or equal to 0 and less than or equal to 25; and

wherein γ is an integer that is greater than or equal to 0 and less than or equal to 25.

Claim 14. (original) A method as claimed in Claim 13, wherein an

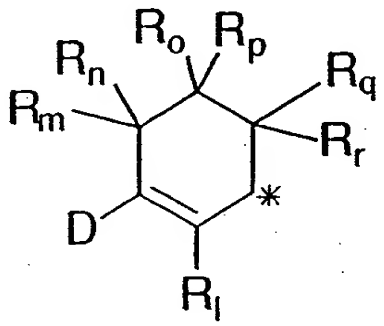
amount of the compound is added to and mixed with the liquid-crystal mixture to yield a resulting mixture, wherein the amount of the compound is less than or equal to about 50% by weight of the resulting mixture.

Claim 15. (currently amended) A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding to the liquid-crystal mixture a compound having a formula A:

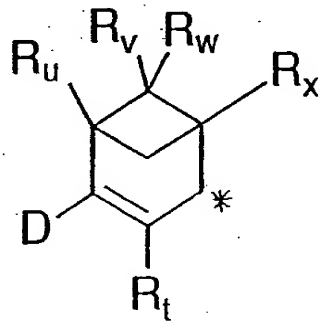


(formula A)

wherein X is selected from the group consisting of

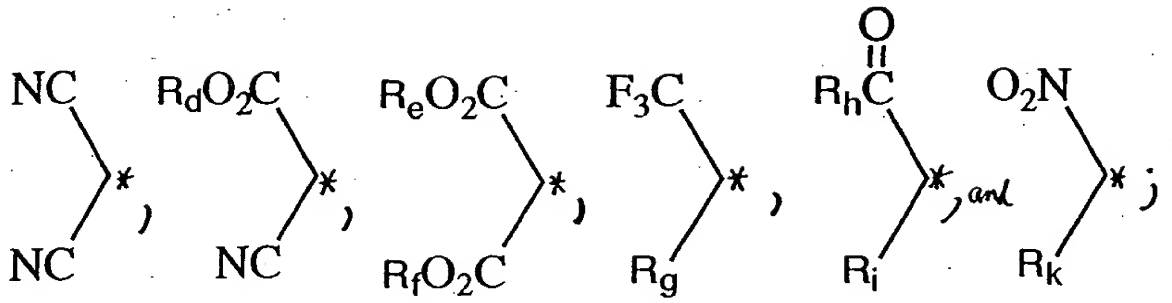


and



wherein D is selected from the group consisting of NR_aR_b, OR_a, SR_a, PR_aR_b, and R_c;

wherein A is selected from the group consisting of:



wherein R_a, R_b, and R_c are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group;

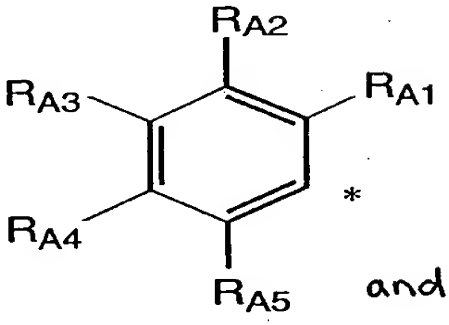
wherein R_d, R_e, R_f, R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_s, R_t, R_u, R_v, R_w, and R_x are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear hydrocarbon group; a branched hydrocarbon group; a cyclic hydrocarbon group ~~that is saturated or unsaturated~~ ; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group; wherein the hydrocarbon group is saturated or unsaturated;

C, cont.

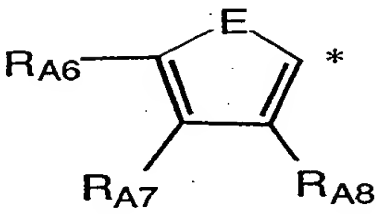
wherein R_g, R_h, R_i, and R_k are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear hydrocarbon group; a branched hydrocarbon group; a cyclic hydrocarbon group ~~that is saturated or unsaturated~~ ; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; an aryl group; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; $-CO_2R_d$; and $-COR_d$; wherein the hydrocarbon group is saturated or

unsaturated;

wherein each aryl group is optionally independently selected from the group consisting of



and



;

wherein R_{A1}, R_{A2}, R_{A3}, R_{A4}, R_{A5}, R_{A6}, R_{A7}, and R_{A8} are the same or different and are each independently selected from the group consisting of H, a linear alkyl group, a branched alkyl group, and a cyclic alkyl group;

C, cont.

wherein E is selected from the group consisting of S, O, and NR_s;

wherein the alkyl group is optionally substituted or unsubstituted and optionally includes up to 25 carbon atoms;

wherein α is an integer that is greater than or equal to 0 and less than or equal to 25;

wherein β is an integer that is greater than or equal to 0 and less than or equal to 25; and

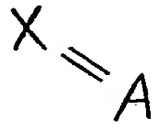
wherein γ is an integer that is greater than or equal to 0 and less than or equal to 25.

Claim 16. (original) A method as claimed in Claim 15, wherein an amount of the compound is added to and mixed with the liquid-crystal mixture to yield a resulting mixture, wherein the amount of the compound is less than or equal to about 50% by weight of the resulting mixture.

Claim 17. (currently amended) A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding a compound to the liquid-crystal mixture to yield a resulting mixture; wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a

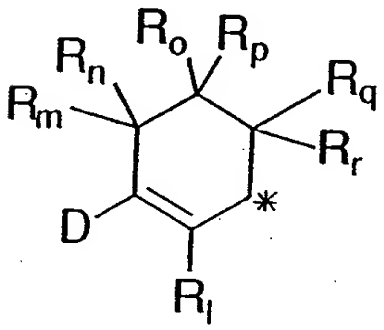
C1 Cont.

refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C; and wherein the compound has a formula A:

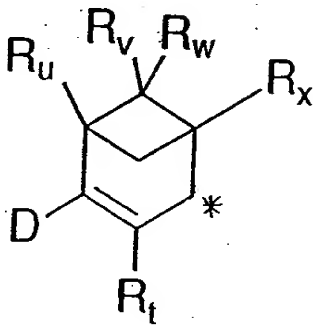


(formula A)

wherein X is selected from the group consisting of



and

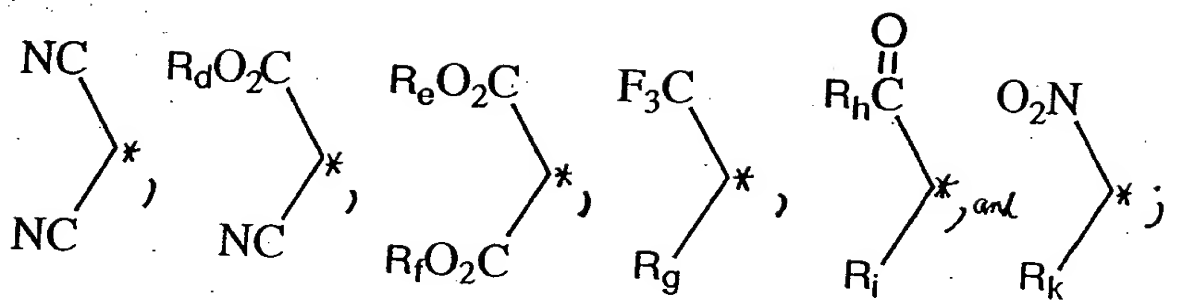


;

Cl cont.

wherein D is selected from the group consisting of NR_aR_b, OR_a, SR_a, PR_aR_b, and R_c;

wherein A is selected from the group consisting of:



wherein R_a, R_b, and R_c are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group;

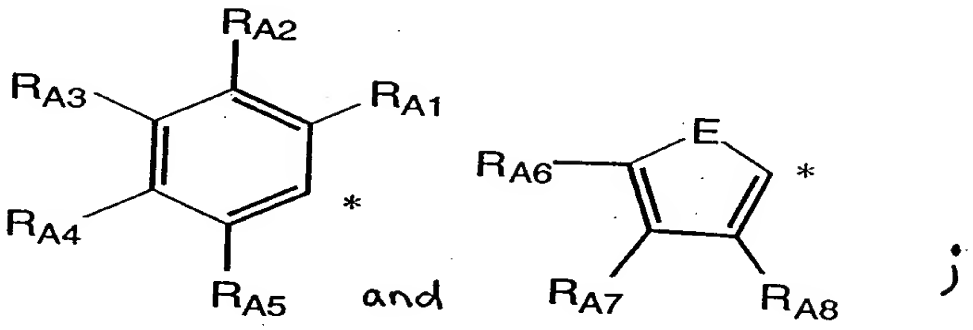
C, cont.

wherein R_d, R_e, R_f, R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_s, R_t, R_u, R_v, R_w, and R_x are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear hydrocarbon group; a branched hydrocarbon group; a cyclic hydrocarbon group ~~that is saturated or unsaturated~~ ; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group; wherein the hydrocarbon group is saturated or unsaturated;

wherein R_g, R_h, R_i, and R_k are the same or different and are each independently selected from the group consisting of: H; a ~~linear, branched, or~~ linear hydrocarbon group; a branched hydrocarbon group; a cyclic hydrocarbon group ~~that is saturated or unsaturated~~ ; a ~~linear, branched, or~~ linear alkyl group; a branched alkyl group; a cyclic alkyl group; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; an aryl group; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; $-CO_2R_d$; and $-COR_d$; wherein the hydrocarbon group is saturated or

unsaturated;

wherein each aryl group is optionally independently selected from the group consisting of



;

wherein R_{A1}, R_{A2}, R_{A3}, R_{A4}, R_{A5}, R_{A6}, R_{A7}, and R_{A8} are the same or different and are each independently selected from the group consisting of H, a linear alkyl group, a branched alkyl group, and a cyclic alkyl group;

C1, cont.

wherein E is selected from the group consisting of S, O, and NR_s;

wherein the alkyl group is optionally substituted or unsubstituted and optionally includes up to 25 carbon atoms;

wherein α is an integer that is greater than or equal to 0 and less than or equal to 25;

wherein β is an integer that is greater than or equal to 0 and less than or equal to 25; and

wherein γ is an integer that is greater than or equal to 0 and less than or equal to 25.

Claim 18. (original) A method as claimed in Claim 17, wherein an

amount of the compound is added to and mixed with the liquid-crystal mixture to yield the resulting mixture, wherein the amount of the compound is less than or equal to about 50% by weight of the resulting mixture.

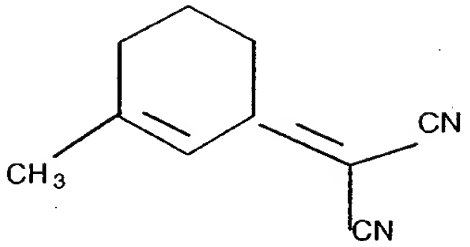
Claim 19. (cancelled)

Claim 20. (original) A composition as claimed in Claim 9, wherein the composition is a liquid-crystal composition.

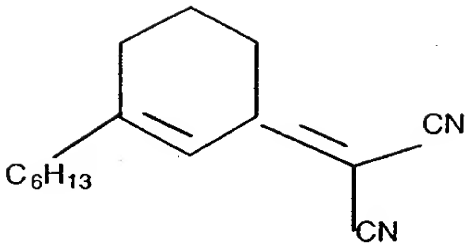
Claim 21. (previously presented) A composition as claimed in Claim 9, wherein R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_t, R_u, R_v, R_w, and R_x are each H; wherein A is C(CN)(CN); and wherein D is R_y or OR_y, and wherein R_y is selected from the group consisting of the linear alkyl group, the branched alkyl group, the cyclic alkyl group, and the aryl group.

C1 cont.

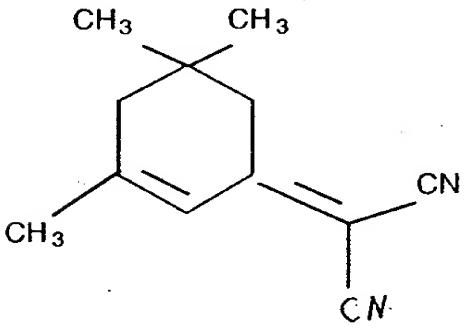
Claim 22. (previously presented) A composition as claimed in Claim 9, wherein the compound is selected from the group consisting of



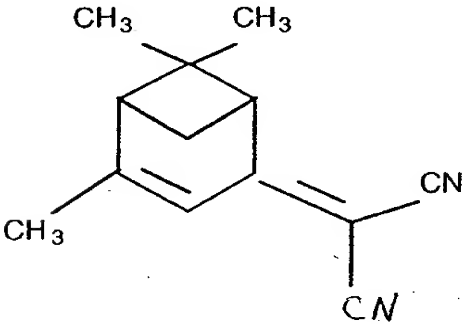
(I)



(II)



(III), and



(IV)

Cl, cont.

Claim 23. (currently amended) A composition as claimed in Claim 9, ~~wherein: when D is NR_aR_b, then α is greater than or equal to 1 and less than or equal to 25;~~

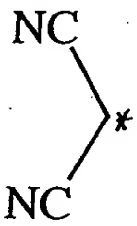
~~wherein when R_l, R_m, R_n, R_o, and R_r are each H, and R_o, R_p, and D are each $-CH_3$, A is not C(CN)(CN);~~

~~wherein when R_l, R_m, R_n, R_o, and R_p are each H, and R_q, R_r, and D are each $-CH_3$, A is not C(CN)(CN);~~

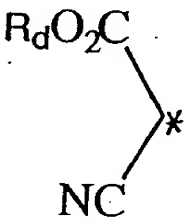
~~wherein when R_l, R_o, R_p, R_q, and R_r are each H, and R_n, R_m, and D are each $-CH_3$, A is not C(CN)(CN); and~~

~~wherein when R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each H, and D is $-CH_3$, A is not C(CN)(CN)~~

wherein A is selected from the group consisting of:



and



;

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wherein R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_t, R_u, R_v, R_w, R_x, and D are each independently selected from the group consisting of: H, methyl, ethyl, propyl, and butyl; and

wherein R_d is selected from the group consisting of methyl, ethyl, propyl, and butyl.

Claim 24. (previously presented) A composition as claimed in Claim 21, wherein the composition is a liquid-crystal composition.

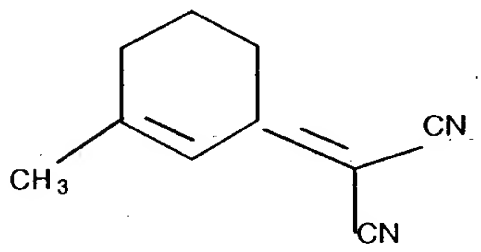
Claim 25. (previously presented) A composition as claimed in Claim 22, wherein the composition is a liquid-crystal composition.

Claim 26. (previously presented) A composition as claimed in Claim 23, wherein the composition is a liquid-crystal composition.

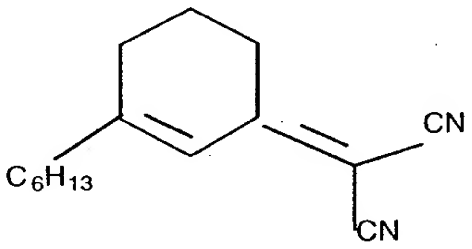
Claim 27. (previously presented) A method as claimed in Claim 11, wherein R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_t, R_u, R_v, R_w, and R_x are each H; wherein A is C(CN)(CN); and wherein D is R_y or OR_y, and wherein R_y is selected from the group consisting of the linear alkyl group, the branched alkyl group, the cyclic alkyl group, and the aryl group.

Claim 28. (previously presented) A method as claimed in Claim 11, wherein the compound is selected from the group consisting of

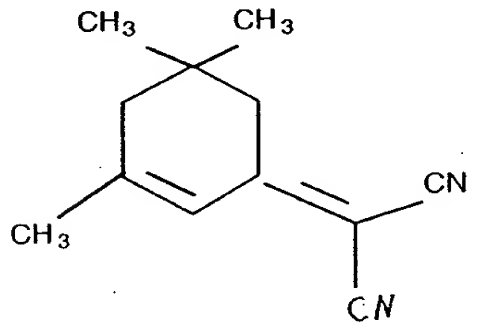
C. cont.



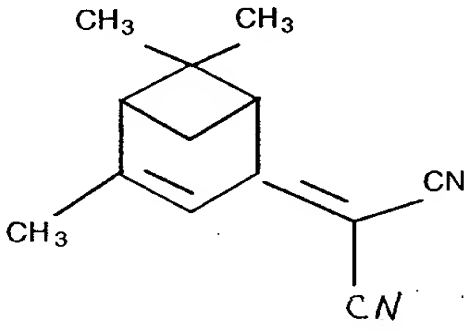
(I)



(II)



(III), and



(IV)

Claim 29. (currently amended) A method as claimed in Claim 11, ~~wherein: when D is NR_aR_b, then α is greater than or equal to 1 and less than or equal to 25;~~

~~wherein when R_l, R_m, R_n, R_q, and R_r are each H, and R_o, R_p, and D are each CH_3, A is not C(CN)(CN);~~

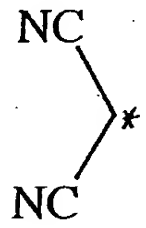
~~wherein when R_l, R_m, R_n, R_o, and R_p are each H, and R_q, R_r, and D are each CH_3, A is not C(CN)(CN);~~

~~wherein when R_l, R_o, R_p, R_q, and R_r are each H, and R_n, R_m, and D are each CH_3, A is not C(CN)(CN); and~~

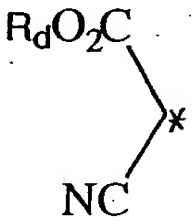
~~wherein when R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each H, and D is CH_3, A is not C(CN)(CN)~~

wherein A is selected from the group consisting of:

C, cont.



and



;

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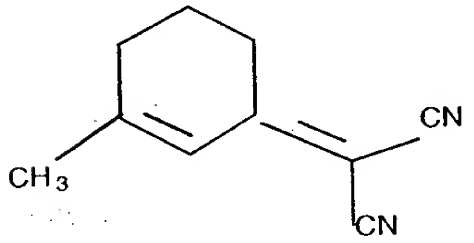
wherein R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_t, R_u, R_v, R_w, R_x, and D are each independently selected from the group consisting of: H, methyl, ethyl, propyl, and butyl; and

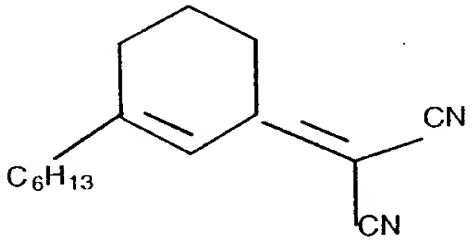
wherein R_d is selected from the group consisting of methyl, ethyl, propyl, and butyl.

Claim 30. (previously presented) A method as claimed in Claim 13, wherein R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_t, R_u, R_v, R_w, and R_x are each H; wherein A is C(CN)(CN); and wherein D is R_y or OR_y, and wherein R_y is selected from the group consisting of the linear alkyl group, the branched alkyl group, the cyclic alkyl group, and the aryl group.

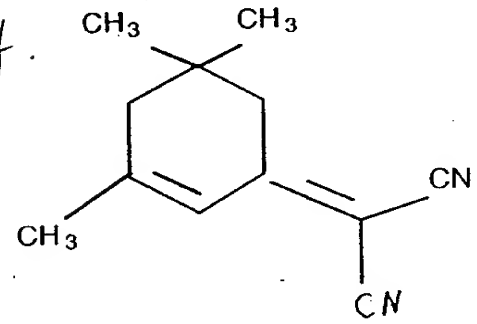
Claim 31. (previously presented) A method as claimed in Claim 13, wherein the compound is selected from the group consisting of



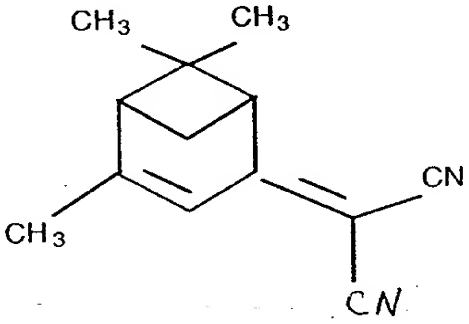
(I)



(II)



(III), and



(IV).

Claim 32. (currently amended) A method as claimed in Claim 13, ~~wherein: when D is NR_aR_b, then α is greater than or equal to 1 and less than or equal to 25; wherein when R_l, R_m, R_n, R_q, and R_r are each H, and R_o, R_p, and~~

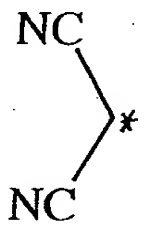
~~D are each CH_3, A is not C(CN)(CN);~~

~~wherein when R_l, R_m, R_n, R_o, and R_p are each H, and R_q, R_r, and D are each CH_3, A is not C(CN)(CN);~~

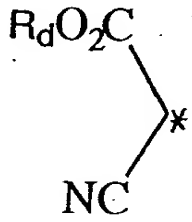
~~wherein when R_l, R_o, R_p, R_q, and R_r are each H, and R_n, R_m, and D are each CH_3, A is not C(CN)(CN); and~~

~~wherein when R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each H, and D is CH_3, A is not C(CN)(CN)~~

wherein A is selected from the group consisting of:



and



;

C1 cont.

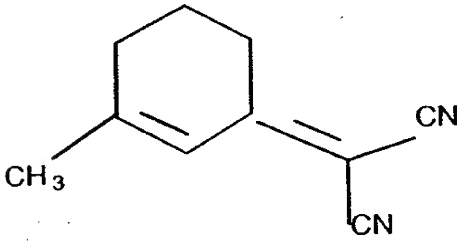
wherein R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_t, R_u, R_v, R_w, R_x, and D are each independently selected from the group consisting of: H, methyl, ethyl, propyl, and butyl; and

wherein R_d is selected from the group consisting of methyl, ethyl, propyl, and butyl.

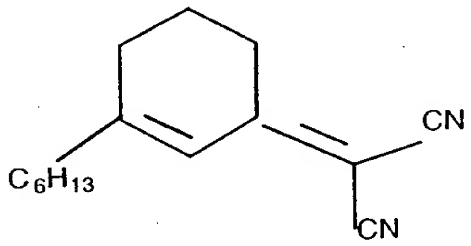
Claim 33. (previously presented) A method as claimed in Claim 15, wherein R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_t, R_u, R_v, R_w, and R_x are each H; wherein A is C(CN)(CN); and wherein D is R_y or OR_y, and

wherein R_y is selected from the group consisting of the linear alkyl group, the branched alkyl group, the cyclic alkyl group, and the aryl group.

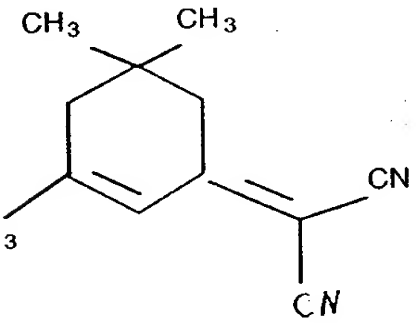
Claim 34. (previously presented) A method as claimed in Claim 15, wherein the compound is selected from the group consisting of



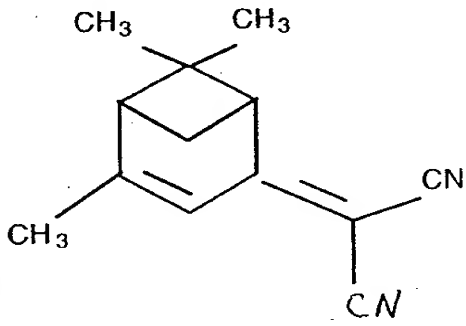
(I)



(II)



(III), and



(IV)

Claim 35. (currently amended) A method as claimed in Claim 15, ~~wherein: when D is NR_aR_b, then α is greater than or equal to 1 and less than or equal to 25;~~

~~wherein when R_l, R_m, R_n, R_q, and R_r are each H, and R_o, R_p, and D are each $-CH_3$, A is not C(CN)(CN);~~

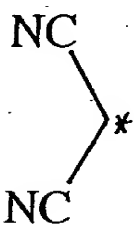
~~wherein when R_l, R_m, R_n, R_o, and R_p are each H, and R_q, R_r, and~~

~~D are each $-CH_3$, A is not C(CN)(CN);~~

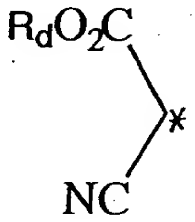
~~wherein when R_l, R_o, R_p, R_q, and R_r are each H, and R_n, R_m, and D are each $-CH_3$, A is not C(CN)(CN); and~~

~~wherein when R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each H, and D is $-CH_3$, A is not C(CN)(CN)~~

wherein A is selected from the group consisting of:



and



;

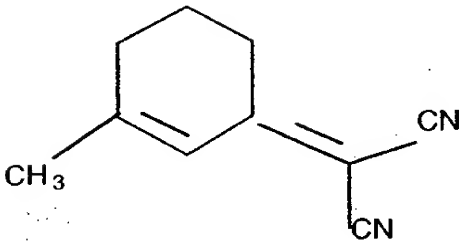
C. cont.

wherein R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_t, R_u, R_v, R_w, R_x, and D are each independently selected from the group consisting of: H, methyl, ethyl, propyl, and butyl; and

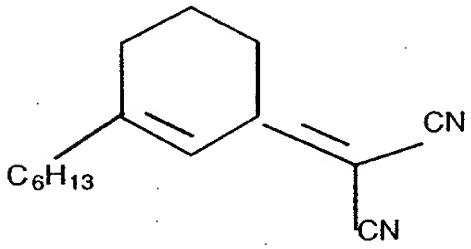
wherein R_d is selected from the group consisting of methyl, ethyl, propyl, and butyl.

Claim 36. (previously presented) A method as claimed in Claim 17, wherein R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_t, R_u, R_v, R_w, and R_x are each H; wherein A is C(CN)(CN); and wherein D is R_y or OR_y, and wherein R_y is selected from the group consisting of the linear alkyl group, the branched alkyl group, the cyclic alkyl group, and the aryl group.

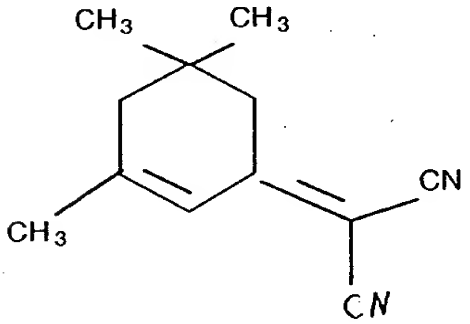
Claim 37. (previously presented) A method as claimed in Claim 17, wherein the compound is selected from the group consisting of



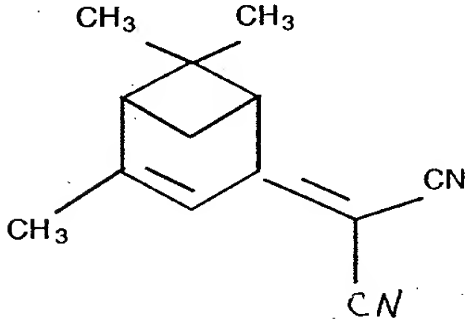
(I)



(II)



(III), and



(IV)

C1 cont.

Claim 38. (currently amended) A method as claimed in Claim 17, ~~wherein: when D is NR_aR_b, then α is greater than or equal to 1 and less than or equal to 25;~~

~~wherein when R_l, R_m, R_n, R_q, and R_r are each H, and R_o, R_p, and D are each CH_3, A is not C(CN)(CN);~~

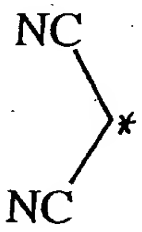
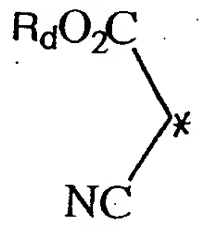
~~wherein when R_l, R_m, R_n, R_o, and R_p are each H, and R_q, R_r, and D are each CH_3, A is not C(CN)(CN);~~

~~wherein when R_l, R_o, R_p, R_q, and R_r are each H, and R_n, R_m, and D are each CH_3, A is not C(CN)(CN); and~~

~~wherein when R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each H, and D is~~

~~CH_3, A is not C(CN)(CN)~~

wherein A is selected from the group consisting of:

and ;

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wherein R_l, R_m, R_n, R_o, R_p, R_q, R_r, R_t, R_u, R_v, R_w, R_x, and D are each independently selected from the group consisting of: H, methyl, ethyl, propyl, and butyl; and

C1 cont.

wherein R_d is selected from the group consisting of methyl, ethyl, propyl, and butyl.

Claims 39-41. (cancelled)

Claim 42. (previously presented) A composition comprising a liquid-crystal mixture and a compound as claimed in Claim 1.

Claim 43. (previously presented) A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 1 to the liquid-crystal mixture.

Claim 44. (previously presented) A method for tuning a clearing

temperature of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 1 to the liquid-crystal mixture.

Claim 45. (previously presented) A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 1 to the liquid-crystal mixture.

Claim 46. (previously presented) A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 1 to the liquid-crystal mixture to yield a resulting mixture, wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C.

Claim 47. (previously presented) A composition comprising a liquid-crystal mixture and a compound as claimed in Claim 2.

C1 cont.

Claim 48. (previously presented) A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 2 to the liquid-crystal mixture.

Claim 49. (previously presented) A method for tuning a clearing temperature of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 2 to the liquid-crystal mixture.

Claim 50. (previously presented) A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 2 to the liquid-crystal mixture.

Claim 51. (previously presented) A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 2 to the liquid-crystal mixture to yield a resulting mixture, wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C.

Claim 52. (previously presented) A composition comprising a liquid-crystal mixture and a compound as claimed in Claim 3.

Claim 53. (previously presented) A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 3 to the liquid-crystal mixture.

Claim 54. (previously presented) A method for tuning a clearing temperature of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 3 to the liquid-crystal mixture.

C1 cont.

Claim 55. (previously presented) A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 3 to the liquid-crystal mixture.

Claim 56. (previously presented) A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 3 to the liquid-crystal mixture to yield a resulting mixture, wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C.

Claims 57-71. (cancelled)

Claim 72. (previously presented) The compound as claimed in Claim 1, wherein the compound is colorless or virtually colorless.

Claim 73. (previously presented) The compound as claimed in Claim 1, wherein the compound has an absorption loss in a visible spectrum at approximately 20-30°C of greater than or equal to 0% and less than or equal to about 5%.

Claim 74. (previously presented) The compound as claimed in Claim 1, wherein the compound has an absorption loss in a visible spectrum at approximately 20-30°C of greater than or equal to 0% and less than or equal to about 1%.

Claim 75. (previously presented) The compound as claimed in Claim 1, wherein the compound has an absorption loss in a visible spectrum at approximately 20-30°C of greater than or equal to 0% and less than or equal to about .01%.

C, cont.

Claim 76. (previously presented) The composition as claimed in Claim 9, wherein the compound is colorless or virtually colorless.

Claim 77. (previously presented) The composition as claimed in Claim 9, wherein the compound has an absorption loss in a visible spectrum at approximately 20-30°C of greater than or equal to 0% and less than or equal to about 5%.

Claim 78. (previously presented) The composition as claimed in Claim 9, wherein the compound has an absorption loss in a visible spectrum at approximately 20-30°C of greater than or equal to 0% and less than or equal to about 1%.

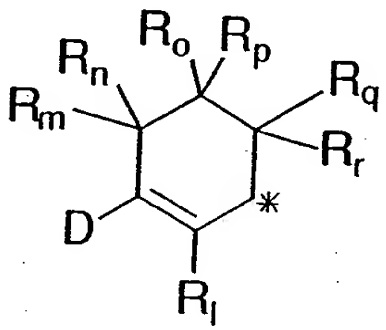
Claim 79. (previously presented) The composition as claimed in Claim 9, wherein the compound has an absorption loss in a visible spectrum at approximately 20-30°C of greater than or equal to 0% and less than or equal to about .01%.

C1 cont.

Claim 80. (new) The compound as claimed in Claim 1, wherein when: D is selected from the group consisting of H, methyl, ethyl, propyl, butyl, aryl, Br, Cl, and I;

R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each independently selected from the group consisting of H, methyl, ethyl, propyl, butyl, aryl, Br, Cl, and I;

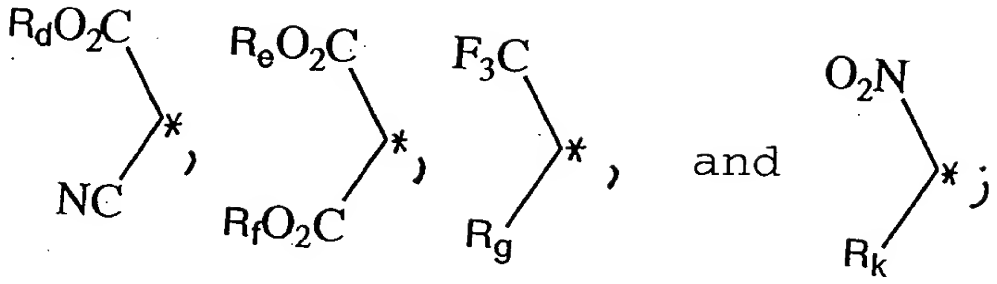
X is



;

C2

and A is selected from the group consisting of:



then: R_d is selected from the group consisting of: H; a linear hydrocarbon group having at least five carbon atoms; a branched hydrocarbon group having at least five carbon atoms; a cyclic hydrocarbon group having at least five carbon atoms; a linear alkyl group having at least five carbon atoms; a branched alkyl group having at least five carbon atoms; a cyclic alkyl group having at least five carbon atoms; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; and $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; wherein the hydrocarbon group is saturated or unsaturated; and

C2 cont.

if R_i is H, R_h is selected from the group consisting of: H; a linear hydrocarbon group having at least five carbon atoms; a branched hydrocarbon group having at least five carbon

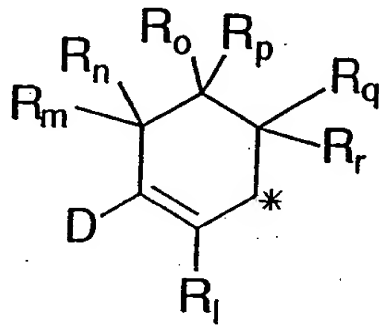
atoms; a cyclic hydrocarbon group having at least five carbon atoms; a linear alkyl group having at least five carbon atoms; a branched alkyl group having at least five carbon atoms; a cyclic alkyl group having at least five carbon atoms; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; an aryl group; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; $-CO_2R_d$; and $-COR_d$; wherein the hydrocarbon group is saturated or unsaturated;

wherein when: D is selected from the group consisting of H, methyl, ethyl, propyl, butyl, aryl, NR_aR_b, R_c, Br, Cl, and I;

C2 cont.

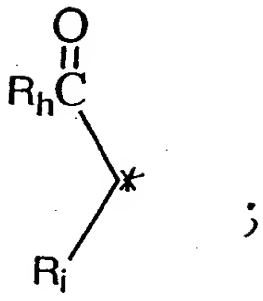
R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each independently selected from the group consisting of H, methyl, ethyl, propyl, butyl, aryl, Br, Cl, and I;

X is



;

and A is



;

then: R_a and R_b are the same or different and are each independently selected from the group consisting of: H; a linear alkyl group having at least five carbon atoms; a branched alkyl group having at least five carbon atoms; a cyclic alkyl group having at least five carbon atoms; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group;

C2 cont.

if D is $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$, α is greater than 0;

R_e and R_f are the same or different and are each independently selected from the group consisting of: H; a linear hydrocarbon group having at least five carbon atoms; a branched hydrocarbon group having at least five carbon

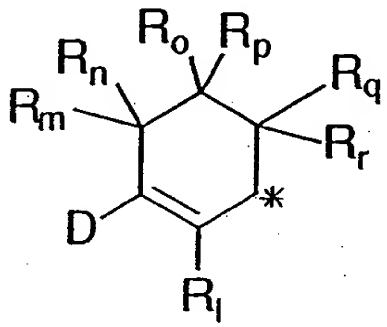
atoms; a cyclic hydrocarbon group having at least five carbon atoms; a linear alkyl group having at least five carbon atoms; a branched alkyl group having at least five carbon atoms; a cyclic alkyl group having at least five carbon atoms; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group; wherein the hydrocarbon group is saturated or unsaturated; and

wherein when: R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each independently selected from the group consisting of H, methyl, ethyl, propyl, butyl, aryl, Br, Cl, and I;

A is C(CN)(CN); and

C2 cont.

X is



;

then: D is selected from the group consisting

of:

NR_aR_b, SR_a, PR_aR_b, and R_c; and

R_c is selected from the group consisting of:

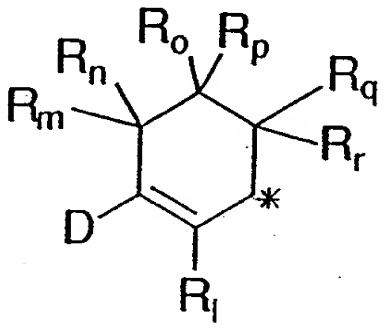
a linear alkyl group having at least five carbon atoms; a branched alkyl group having at least five carbon atoms; a cyclic alkyl group having at least five carbon atoms; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group.

C2 cont.

Claim 81. (new) The compound as claimed in Claim 1, wherein when: D is selected from the group consisting of H, a linear alkyl group, a branched alkyl group, a cyclic alkyl group, an aryl group, Br, Cl, and I;

R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each independently selected from the group consisting of H, a saturated hydrocarbon group, an unsaturated hydrocarbon group, an aryl group, Br, Cl, and I;

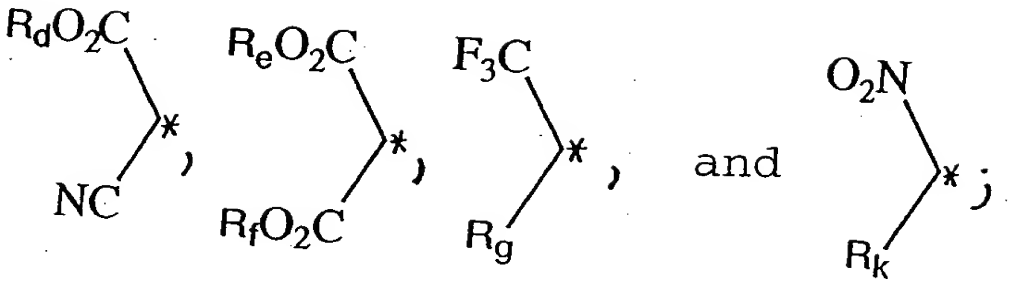
X is



;

C2 cont.

and A is selected from the group consisting of:



then: R_d is selected from the group consisting of:

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; and

$-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and

C2 cont.

if R_i is H, R_h is selected from the group consisting of:

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$;

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$;

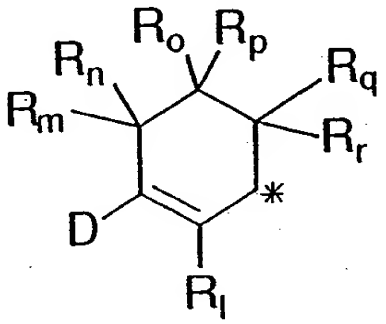
$-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; an aryl group;

$-(CH_2)_\alpha(CF_2)_\gamma CF_3$; $-CO_2R_d$; and $-COR_d$;

wherein when: D is selected from the group consisting of H, a linear alkyl group, a branched alkyl group, a cyclic alkyl group, an aryl group, NR_aR_b, R_c, Br, Cl, and I;

R_1, R_m, R_n, R_o, R_p, R_q, and R_r are each independently selected from the group consisting of H, a saturated hydrocarbon group, an unsaturated hydrocarbon group, an aryl group, Br, Cl, and I;

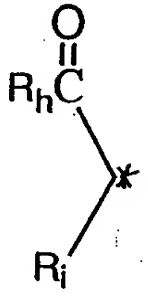
X is



;

Cont.

and A is



;

then: R_a and R_b are the same or different and are each independently selected from the group consisting of: H; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group;

if D is $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$, α is greater than 0;

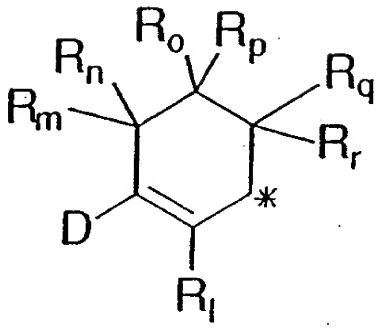
R_e and R_f are the same or different and are each independently selected from the group consisting of: $-(CH_2CH_2O)_\alpha-(CH_2)_\beta OR_{A1}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta NR_{A2}R_{A3}$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Cl$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta Br$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta I$; $-(CH_2CH_2O)_\alpha-(CH_2)_\beta$-Phenyl; $-(CH_2)_\alpha(CF_2)_\gamma CF_3$; and an aryl group; and

C2 cont.

wherein when: R_l, R_m, R_n, R_o, R_p, R_q, and R_r are each independently selected from the group consisting of H, a saturated hydrocarbon group, an unsaturated hydrocarbon group, an aryl group, Br, Cl, and I;

A is C(CN)(CN); and

X is



;

then: D is selected from the group consisting of:

SR_a, PR_aR_b, and R_c; and

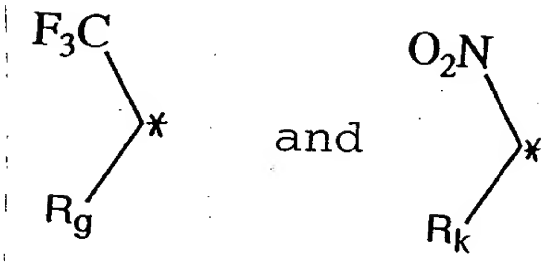
R_c is selected from the group consisting of:

$-(CH_2CH_2O)_\alpha-(CH_2)_\beta CN$; and

$-(CH_2)_\alpha(CF_2)_\gamma CF_3$.

C2 cont.

Claim 82. (new) The compound as claimed in Claim 1, wherein A is selected from the group consisting of



C2 cont.

Claim 83. (new) The compound as claimed in Claim 1, wherein A is C(CN)(CN).

Claim 84. (new) The compound as claimed in Claim 2, wherein A is C(CN)(CN).

Claim 85. (new) The composition as claimed in Claim 9, wherein A is C(CN)(CN).

Claim 86. (new) The method as claimed in Claim 11, wherein A is C(CN)(CN).

Claim 87. (new) The method as claimed in Claim 13, wherein A is C(CN)(CN).

Claim 88. (new) The method as claimed in Claim 15, wherein A is C(CN)(CN).

Claim 89. (new) The method as claimed in Claim 17, wherein A is C(CN)(CN).

Claim 90. (new) The composition as claimed in Claim 42, wherein A is C(CN)(CN).

Claim 91. (new) The method as claimed in Claim 43, wherein A is C(CN)(CN).

Claim 92. (new) The method as claimed in Claim 44, wherein A is C(CN)(CN).

Claim 93. (new) The method as claimed in Claim 45, wherein A is C(CN)(CN).

C2 cont.

Claim 94. (new) The method as claimed in Claim 46, wherein A is C(CN)(CN).

Claim 95. (new) The composition as claimed in Claim 47, wherein A is C(CN)(CN).

Claim 96. (new) The method as claimed in Claim 48, wherein A is C(CN)(CN).

Claim 97. (new) The method as claimed in Claim 49, wherein A is C(CN)(CN).

Claim 98. (new) The method as claimed in Claim 50, wherein A is C(CN)(CN).

Claim 99. (new) The method as claimed in Claim 51, wherein A is C(CN)(CN).

Claim 100. (new) The compound as claimed in Claim 72, wherein A is C(CN)(CN).

Claim 101. (new) The compound as claimed in Claim 73, wherein A is C(CN)(CN).

Claim 102. (new) The compound as claimed in Claim 74, wherein A is C(CN)(CN).

Claim 103. (new) The compound as claimed in Claim 75, wherein A is C(CN)(CN).

Claim 104. (new) The composition as claimed in Claim 76, wherein A is C(CN)(CN).

C2 cont.

Claim 105. (new) The composition as claimed in Claim 77, wherein A is C(CN)(CN).

Claim 106. (new) The composition as claimed in Claim 78, wherein A is C(CN)(CN).

Claim 107. (new) The composition as claimed in Claim 79, wherein A is C(CN)(CN).

Claim 108. (new) A composition comprising a liquid-crystal mixture and a compound as claimed in Claim 39.

Claim 109. (new) A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 80 to the liquid-crystal mixture.

Claim 110. (new) A method for tuning a clearing temperature of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 80 to the liquid-crystal mixture.

Claim 111. (new) A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 80 to the liquid-crystal mixture.

Claim 112. (new) A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 80 to the liquid-crystal mixture to yield a resulting mixture, wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C.

C2 cont.

Claim 113. (new) A composition comprising a liquid-crystal mixture and a compound as claimed in Claim 81.

Claim 114. (new) A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 81 to the liquid-crystal mixture.

Claim 115. (new) A method for tuning a clearing temperature of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 81 to the liquid-crystal mixture.

Claim 116. (new) A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 81 to the liquid-crystal mixture.

Claim 117. (new) A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 81 to the liquid-crystal mixture to yield a resulting

mixture, wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C.

Claim 118. (new) A composition comprising a liquid-crystal mixture and a compound as claimed in Claim 82.

Claim 119. (new) A method for reducing an operation voltage of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 82 to the liquid-crystal mixture.

Claim 120. (new) A method for tuning a clearing temperature of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 82 to the liquid-crystal mixture.

C2 cont.

Claim 121. (new) A method for tuning birefringence of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 82 to the liquid-crystal mixture.

Claim 122. (new) A method for increasing a $\partial n/\partial T$ of a liquid-crystal mixture, the method comprising adding the compound claimed in Claim 82 to the liquid-crystal mixture to yield a resulting mixture, wherein the resulting mixture at about 20-30°C has a $\partial n/\partial T$ larger than about 0.005, wherein n is a refractive index of the resulting mixture and T is a temperature of the resulting mixture in °C.